REMARKS

Upon entry of the present amendment, claims 1-8 and 10-19 will be pending. Claims 1, 13, 14, 16, 17, and 19 have been amended to specify that the continuous phase comprise a reactive curing binder precursor. Support for the amendment can be found, for example, at page 6, line 3. Claim 10 has been amended in view of the cancellation of claim 9. Reconsideration of the application in view of the following remarks is respectfully requested.

I. Claims 11 and 12 are Not Obvious in view of Bruxvoort

Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Bruxvoort (U.S. Pat. No. 5,958,794). The Advisory Action did not address this rejection. Applicants request reconsideration of this rejection because, as acknowledged in the Office Action dated August 20, 2004, Applicants have successfully overcome the rejection of claims 1-10 in view of Bruxvoort when Bruxvoort is not combined with other references. Claims 11 and 12 depend from claim 1. Accordingly, since claim 1 has been found patentable over Bruxvoort, dependent claims 11 and 12 must also be patentable over Bruxvoort and the rejection should be withdrawn.

II. Claims 17 and 18 are Not Obvious in view of Bruxvoort and Chen

Claims 17 and 18 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Bruxvoort in view of Chen (U.S. Pat. No. 6,048,677). Applicants request reconsideration of this rejection because there is no evidence of record indicating that those of ordinary skill would have been properly motivated to combine one of the dispersants reported by Chen into a dispersion taught by Bruxvoort. Further, even if one skilled in the art chose to combine one of the dispersants reported by Chen into a dispersion taught by Bruxvoort, there is no teaching or suggestion to combine them in a manner that would have produced Applicants' claimed invention because there is no teaching or suggestion in either Chen or Bruxvoort concerning useful dispersant molecular weights or amine values as recited in Applicants' claims.

The Office Action alleges that Chen teaches a coating composition having a binder that can be an acrylate. The Office Action then states "Solsperse 24000 is specifically taught to

improve the dispersability of particles ... in the same type of binder utilized by Bruxvoort." The Office Action alleges that one skilled in the art would be "especially motivated" to combine the teachings of Chen with those of Bruxvoort because "Bruxvoort essentially states that the surfactant can be any type of surfactant, so long as it is compatible with the binder precursor and the abrasive particle."

Applicants disagree with the reasoning presented in the Office Action and Advisory Action. Chen provides no teaching or suggestion that Solsperse 24000 is useful as a dispersant for superabrasive particles in the acrylate binder precursors reported by Bruxvoort. In view of this deficiency, the Examiner states in the Advisory Action that "Chen is relied on ... to show that Solsperse 24000 is known in the art to be compatible with acrylates, and is useful for increasing the dispersability of abrasive particles such as iron oxide, diamonds, and titanium oxide" (Advisory Action, page 2, lines 14-18). Chen, however, is not concerned with reactive binder precursors. Rather, the binder reported by Chen is wax with less than 10% of a non-crosslinked polymer phase additive that may be acrylic (see, e.g., col. 3, lines 31-35). The fact that Solsperse 24000 may be "compatible" with a wax binder with less than 10% of a non-crosslinked polymer phase additive that may be acrylic, says little, if anything, about whether Solsperse 24000 is useful for dispersing superabrasive particles in the reactive acrylate binder precursors reported by Bruxvoort.

It is important to note that the selection of a suitable dispersant for a particular combination of particles and a continuous phase is not a trivial matter (see, e.g., Parfitt, G.D., "Fundamental Aspects of Dispersion" in *Dispersion of Powders in Liquids (with Special Reference to Pigments)* 3rd edition, ed. G.D. Parfitt (New Jersey: Applied Science Publishers, 1981), 1:1-50). "Surface active agents often play a leading role in all three aspects of the dispersion process, although they might easily be useful in one but antagonistic in another. There are no simple rules; each case has to be considered in detail." (*id.* at page 4).

As in Bruxvoort, Chen lists diamond in a list of known abrasive particles. Similarly, Chen lists Solsperse 24000 as a useful wetting agent (col. 6, lines 14-18) and includes a rather lengthy generalized list of flurorochemicals, polysiloxanes, and fatty acid derivatives as other "surfactants, dispersants, or coating aids" that can be included in the lubricant layer (col. 6, lines 19-35). Although Solsperse 24000 and diamond both appear in Chen, there is nothing to suggest

that their combination in a different binder system would produce the results obtained by Applicants. Further, in view of the complex issues involved in selecting a dispersant for a particular combination of abrasive particles and binder, one skilled in the art would not have a reasonable expectation of success that Solsperse 24000 would be useful in dispersing diamonds in the reactive acrylate binder precursors reported by Bruxvoort. Accordingly, there is no motivation to place one of the dispersants reported by Chen into a dispersion reported by Bruxvoort.

Further, claims 17 and 18 specify that the dispersant comprise "a polymer having an average molecular weight (Mw) of greater than 500 and an AV of greater than 4.5." Neither Bruxvoort nor Chen teach or suggest these additional criteria for selecting the dispersant. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 17 and 18 under 35 U.S.C. § 103.

III. Claims 1-4, 7, 8, and 10-19 are Not Obvious in view of Bruxvoort and Kamikubo

Claims 1-4 and 7, 8, and 10-19 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Bruxvoort in view of Kamikubo (U.S. Pat. No. 5,698,618). Applicants request reconsideration of this rejection because there is no evidence of record indicating that those of ordinary skill would have been properly motivated to combine one of the dispersants reported by Kamikubo into a dispersion taught by Bruxvoort. Further, even if one skilled in the art chose to combine one of the dispersants reported by Kamikubo into a dispersion taught by Bruxvoort, there is no teaching or suggestion in either Kamikubo or Bruxvoort concerning useful dispersant molecular weights or amine values as recited in Applicants' claims.

In considering the combination of Bruxvoort with Kamikubo, the Examiner leaves the abrasive art and turns to the unrelated art of acid-set coating varnishes. Kamikubo reports a coating composition formed from an acid-set coating varnish and pigment composition. The coating composition is reported to excel in color pigment dispersion and have excellent color tone and weather resistance (abstract). The coating composition is suitable for use in a coating for a vehicle (col. 14, lines 65-67).

The Examiner alleges that Kamikubo is analogous art because "one of ordinary skill in [the abrasive] art would have knowledge of compositions comprising polymer binders containing particles and dispersants" (Advisory Action, page 4, lines 19-21). In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor is involved. *In re Bigio*, 381 F.3d 1320, 1325; 72 U.S.P.Q.2d 1209, 1212 (Fed. Cir. Aug. 24, 2004); In *re Clay*, 966 F.2d 656, 659; 23 U.S.P.Q.2d 1058, 1060 (Fed. Cir. 1992). Knowledge of a broader class of compositions beyond the abrasive arts is not the proper inquiry. The Examiner's assertion that one skilled in the art would have knowledge of compositions "comprising polymer binders containing particles and dispersants" would bring such diverse fields as paint, abrasives, and pharmaceuticals into a common field of art. Applicants field of endeavor is in the abrasive arts. Kamikubo's field of endeavor is colored coating compositions for vehicles. Accordingly, Kamikubo is in a different field of endeavor than Applicants' present invention.

The Examiner alleges that Kamikubo can be considered analogous art because it is concerned with the same problem with which the inventor is involved, and defines the particular problem as "improving disperability of abrasive particles in binders" (Advisory Action, page 5, lines 3-8). Applicants, however, are not addressing the particular problem of "improving the dispersability of abrasive particles in binders". Rather, the particular problem with which Applicants are concerned is the need to produce an abrasive article that delivers a smooth surface finish without scratches while maintaining a high degree of dimensional control.

A **solution** to the problem addressed by Applicants is to construct an abrasive article using a combination of superabrasive, reactive curing binder precursor, and a dispersant. The Examiner uses the solution to the problem addressed by Applicants rather than the problem itself. In doing so, the Examiner uses impermissible hindsight to define the problem in terms of its solution. *Monarch Knitting Machinery Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881, 45U.S.P.Q.2d 1977, 1981 (Fed. Cir. 1998) ("Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness"). For this reason alone, the rejection of claims 1-4, 7, 8, and 10-19 in view of Bruxvoort and Kamikubo should be withdrawn.

Further, the Examiner characterizes the pigments of Kamikubo as titanium oxide or iron oxide, neither of which is a superabrasive, and asserts that the "dispersants taught by Kamikubo are specifically shown to be compatible with the binder and particles utilized in Bruxvoort." This statement is unsupported because the dispersant reported by Kamikubo is used to disperse different particles, in a different medium, for a different purpose, for an article having different criteria for success. The role of the pigment reported in Kamikubo is a colorant and the dispersion is used to obtain a desired visual effect in the applied coating. In contrast, Applicants' claimed invention concerns the abrasive arts and the dispersant is used to disperse superabrasive particles to obtain a desired mechanical effect in the abrasive article.

The dispersant reported by Kamikubo is used to disperse different particles than those of Bruxvoort or the present invention. Kamikubo does not teach the use of Solsperse 24000 or other polymeric amines to disperse either TiO_2 or Fe_2O_3. Rather, at column 2, lines 36-58, Kamikubo states:

> The present invention is a coating composition comprising: an acid-set coating varnish; and a pigment composition formed of 0.5 to 30 parts by weight, per 100 parts by weight of pigment, of an organic dyestuff derivative represented by following general formula (1) or an aluminum salt of the organic dyestuff derivative, and 0.5 to 100 parts by weight of a basic-group-containing resin-type pigment dispersant whose weight average molecular weight is 1,000 to 100,000 and whose amine value is 10 to 200 mg KOH/g.

Accordingly, the Kamikubo invention relates to a dispersant for an organic dyestuff derivative or an aluminum salt of an organic dyestuff derivative. The TiO_2 and Fe_2O_3 pigments appear at col. 3, lines 6-11, as two of ten exemplary inorganic colorants and TiO_2 appears at col. 11, lines 12-16, where, "[p]ale color coatings were prepared by diluting the above coating compositions with a titanium oxide base coating (i.e., a dispersion paste of titanium oxide with 50 phr of **titanium oxide being dispersed with acryl/melamine resin**) such that the pigment to titanium oxide ratio was 1/10" (emphasis added). The dispersant for the TiO_2 tint base was an acryl/melamine resin, not Solsperse 24000. At best, Kamikubo may be said to teach that the Solsperse 24000 did not immediately flocculate the pre-dispersed TiO_2, although color separation was noted after combining the dispersions. There is simply no teaching or suggestion in Kamikubo that Solsperse 24000 be used to disperse TiO_2 or Fe_2O_3.

Further, the dispersant reported by Kamikubo is used to disperse particles in a different medium. The resins reported by Kamikubo are described at column 5, lines 5-20, as:

> A hydroxyl group-containing resin (a) used in the present invention is the base resin and has, in each molecule, at least two hydroxyl groups which are reactive sites with the higher alkyletherified melamine resin (b). Examples of the hydroxyl group-containing resin include polyesterpolyol resin, alkydpolyol resin, acrylpolyol resin, epoxypolyol resin, epoxyesterpolyol resin and the like. Among these resins, at least one resin selected from the group of acrylpolyol resin and alkydpolyol resin is preferable. The weight average molecular weight of the hydroxyl group-containing resin (a) is not limited particularly since the hydroxyl group-containing resin excels in dispersibility of the pigment in a wide range from low molecular weights to high molecular weights due to use of the organic dyestuff derivative or an aluminum salt of the organic dyestuff derivative together with the basic-group-containing resin-type pigment dispersant.

The acrylpolyol resin is specified to be a hydroxyl group-containing vinyl monomer homopolymer or a vinyl copolymer comprising a hydroxyl group-containing vinyl monomer at column 5, lines 40-52:

> The acrylpolyol resin is obtained by homopolymerizing a hydroxyl group-containing vinyl monomer, or by copolymerizing a hydroxyl group-containing vinyl monomer and any one of alkyl(meth)acrylate monomer, a carboxylic acid-containing monomer, a styrenic monomer and a vinyl monomer.

These resin materials are already polymerized and are not reactive acrylate monomer binder precursors as reported in Bruxvoort. Accordingly, the medium reported by Kamikubo is not the same as the medium reported in Bruxvoort.

Further, as discussed above, in view of the complex issues involved in selecting a dispersant for a particular combination of abrasive particles and binder, even if one were to combine the teaching of Bruxvoort and Kamikubo, one skilled in the art would not have a reasonable expectation of success that Solsperse 24000 would be useful in dispersing diamonds in the reactive acrylate binder precursors reported by Bruxvoort. Accordingly, there is no motivation to place one of the dispersants reported by Kamikubo into a dispersion reported by Bruxvoort. There is simply no teaching or suggestion in Kamikubo concerning the usefulness of a particular dispersant for superabrasive particles. For this reason alone, the rejection of claims 1-4 and 7, 8, and 10-19 in view of Bruxvoort and Kamikubo should be withdrawn.

Further, claims 1-4 and 7, 8, and 10-19 specify that the dispersant comprise a polymer having a specified average molecular weight and a specified AV. Neither Bruxvoort nor Kamikuba teach or suggest these additional criteria for selecting the dispersant. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-4 and 7-19 under 35 U.S.C. § 103.

IV. Claims 5 and 6 are Not Obvious in view of Bruxvoort and Suzuki

Claims 5 and 6 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Bruxvoort in view of Suzuki (U.S. Pat. No. 5,998,091). Applicants request reconsideration of this rejection because there is no evidence of record indicating that those of ordinary skill would have been properly motivated to combine one of the dispersants reported by Suzuki into a dispersion taught by Bruxvoort. Further, even if one skilled in the art chose to combine one of the dispersants reported by Suzuki into a dispersion taught by Bruxvoort, there is no teaching or suggestion in either Suzuki or Bruxvoort concerning useful dispersant molecular weights or amine values as recited in Applicants' claims.

In considering the combination of Bruxvoort with Suzuki, the Examiner again leaves the abrasive art and turns to the unrelated art of color filters. Suzuki reports a colored composition for the production of a color filter. The coating composition is reported to improve color pigment dispersion and insure excellent pattern reproducibility in a color filter (col. 1, lines 5-15). Suzuki disperses a variety of colored organic compounds as pigments, particularly isoindoline or isoindolinone pigments, in binders having specific chemical functionality. Other pigments, including inorganic pigments, are mentioned in passing, however the role of the pigment is that of a colorant for the color filter and the metal oxides listed are those generally associated with the colorant art rather than abrasive art.

The Examiner alleges that Suzuki is analogous art because "one of ordinary skill in the art would certainly have knowledge of a broader class of compositions, namely those containing particles, binder, and a dispersant" (Advisory Action, page 8, lines 7-10). In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor is involved. *In re Bigio*, 381 F.3d 1320, 1325; 72 U.S.P.Q.2d 1209,

1212 (Fed. Cir. Aug. 24, 2004); In *re Clay*, 966 F.2d 656, 659, 23 U.S.P.Q.2d 1058, 1060 (Fed. Cir. 1992). Knowledge of a broader class of compositions beyond the abrasive arts is not the proper inquiry. The Examiner's assertion that one skilled in the art would have knowledge of compositions "containing particles, binder, and a dispersant" would bring such diverse fields as paint, abrasives, and pharmaceuticals into a common field of art. Applicants field of endeavor is in the abrasive arts. Suzuki's field of endeavor is colored filters. Accordingly, Suzuki is in a different field of endeavor than Applicants' present invention.

The Examiner alleges that Suzuki can be considered analogous art because it is concerned with the same problem with which the inventor is involved, "namely the dispersability of particles in a binder" (Advisory Action, page 8, line 13). Applicants, however, are not addressing the particular problem of dispersing particles in a binder." Rather, the particular problem with which Applicants are concerned is the need to produce an abrasive article that delivers a smooth surface finish without scratches while maintaining a high degree of dimensional control.

A **solution** to the problem addressed by Applicants is to construct an abrasive article using a combination of superabrasive, reactive curing binder precursor, and a dispersant comprising a polymer having a molecular weight (Mw) of greater than 500 and an AV of greater than 4.5. The Examiner uses the solution to the problem addressed by Applicants rather than the problem itself. In doing so, the Examiner uses impermissible hindsight to define the problem in terms of its solution. *Monarch Knitting Machinery Corp. v. Sulzer Morat GmbH*, 139 F.3d 877, 881, 45U.S.P.Q.2d 1977, 1981 (Fed. Cir. 1998) ("Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness").

In contrast, Applicants' claimed invention concerns the abrasive arts and the dispersant is used to disperse superabrasive particles to obtain a desired mechanical effect in the abrasive article. There is simply no teaching or suggestion in Suzuki concerning the usefulness of a particular dispersant for superabrasive particles. For this reason alone, the rejection of claims 5 and 6 in view of Bruxvoort and Suzuki should be withdrawn.

Further, claims 5 and 6 specify that the dispersant comprise a polymer having a specified average molecular weight and a specified AV. Neither Bruxvoort nor Suzuki teach or suggest

these additional criteria for selecting the dispersant. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 5 and 6 under 35 U.S.C. § 103.

V. Conclusion

In view of the above, it is submitted that the application is in condition for allowance. Reconsideration of the application is requested. The Examiner is invited to contact Applicants' undersigned representative with any questions concerning the present application.

Respectfully submitted,

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